DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-4, 7-17, 22-30, 33-34, 37-39 and 42- 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hailey (US 6,349,038 B1) in view of Andoh et al. (US 2004/0089471 A1) and Levite et al. (US 5,493,076).

Pertaining to claims 1, 25 and 26, Hailey discloses an electrical component (see fig. 4A), involving: bonding a thin metal foil (302, see fig. 4) to an insulating substrate (300, see fig. 3) and thereby forming a component blank having a metal face

that comprises a surface of said metal foil (302); the metal foil (302) of said component blank to produce at least one trench (306, see figs. 3-4a) for defining one or more foil tracks, said trench being at least equal in depth (see figs. 3-4a) to the thickness of the foil so as to prevent current flow across the trench; and filling said trench with a trench filling material (dielectric-filled moat 306, see column 5, lines 16-20) without overlaying said metal face with said trench filling material (dielectric-filled moat 306, see column 5, lines 16-20).

But, Hailey does not explicitly teach a laser machine.

Hailey also fails to specifically teach laser machine without fully penetrating the insulating substrate.

However, Andoh et al. teaches a laser machine (see paragraph [0006], lines 12-14) and Levite et al. also teaches a trench of substrate without fully penetrated.

Therefore, it would be obvious to one having ordinary skill in the art at the time the invention was made to provide a laser machine for the manufacturing printed circuit board of Hailey based on the teachings of Andoh et al. and also to provide a trench of substrate without fully penetrated based on the teaching of Levite et al. in order to form a holes having a minute diameter in accordance with a minute wiring pattern can be formed easily at a high speed or produce a trench for define foil tracks and furthermore, provide at least one electrically conductive media that will provide electrical continuity to an electrical line while a portion of the electrically conductive media is in a trench adjacent the defective area.

Pertaining to claims 2 and 28, Hailey as modified by Andoh et al. further discloses including performing said laser machining by means of a laser (see paragraph [0006], lines 12-14 of Andoh et al.) with a cutting width (the width of the 306), and creating foil tracks with a spacing approximately equal to said cutting width (see figs. 3-4A).

Pertaining to claims 4, 30 and 33, Hailey as modified by Andoh et al.further discloses wherein said trench filling material is an insulating material (dielectric-filled moat 306, see column 5, lines 16-20).

Pertaining to claim 7, Hailey as modified by Andoh et al.further discloses said trench filling material (dielectric-filled moat 306, see column 5, lines 16-20) is a dielectric material and said electric component is a sensor that responds to changes in said dielectric material (dielectric-filled moat 306, see column 5, lines 16-20) .

Pertaining to claim 8, Hailey as modified by Andoh et al. further discloses electrical component (see fig. 4A) is a foil sensor, and said method further comprises forming said metal foil (302) from a parent foil that is substantially identical with the material of the structure to be monitored (see fig. 4).

Pertaining to claim 9, Hailey as modified by Andoh et al. further discloses laser machining said component blank to produce one or more back slots, said back slots being equal in depth to the full thickness of said component blank (see figs. 3-4)

Pertaining to claims 12 and 13, Hailey as modified by Andoh et al. further discloses preparing the metal foil (302) by machining a sample of parent material to a desired final thickness (see figs 3-4A).

Pertaining to claim 14, Hailey as modified by Andoh et al. further discloses preparing the metal foil (302) for said bonding by applying a chemically resistant film to a first face of said foil, and applying a bond enhancer to the other face of said foil, wherein said first face is ultimately the exposed face and said chemically resistant film protects said first face from said bond enhancer (see figs. 3-4A).

Pertaining to claim 15, Hailey as modified by Andoh et al. further discloses drying said foil and then removing said film (see figs. 3-4A).

Pertaining to claim 16, Hailey as modified by Andoh et al. further discloses chemically resistant film comprises a polyester tape (see paragraph [0368] of Hirose).

Pertaining to claim 17, Hailey as modified by Andoh et al. further discloses said insulating material is chosen to have an ablation rate that is sufficiently low to prevent unwanted penetration of the substrate (see figs. 3-4A) during machining to remove said

foil (see figs. 3-4A).

Pertaining to claims 22 and 34, Hailey as modified by Andoh et al. further discloses said electrical component (see fig. 4A) is selected from the group of: a linear polarization resistance gauge; a corrosion sensor; a resistance sensor; a non-destructive testing sensor; a spiral inductor; a delay line; a capacitor; and a sensor responsive to changes in a dielectric: material (column 5, lines 26-32).

Pertaining to claims 23 and 37, Hailey as modified by Andoh et al. further discloses said trench with a ratio of depth to width of form 1:1 to 7:1, (see figs. 3-4A).

Pertaining to claims 24 and 38, Hailey as modified by Andoh et al. further discloses said trench with side walls that are substantially straight (see figs. 3-4A).

Pertaining to claims 27 and 42 and 45, Hailey further discloses an electrical component (see fig. 4A), involving: bonding a thin metal foil (302, see fig. 4) to an insulating substrate (300, see fig. 3) and thereby forming a component blank having a metal face that comprises a surface of said metal foil (302); laser machining at least the metal foil (302) of said component blank to produce at least one trench (306, see figs. 3-4a) for defining one or more foil tracks, said trench being at least equal in depth (see figs. 3-4a) to the thickness of the foil so as to prevent current flow across the trench; and filling said trench with a trench filling material (dielectric-filled moat 306, see column

5, lines 16-20) without overlaying said metal face with said trench filling material (dielectric-filled moat 306, see column 5, lines 16-20) applied without overlaying said metal face (see figs. 3-4a).

But, Hailey does not explicitly teach a laser machine.

Hailey also fails to specifically teach a laser machine without fully penetrating the insulating substrate.

However, Andoh et al. teaches a laser machine (see paragraph [0006], lines 12-14) and Levite et al. also teaches a trench of substrate without fully penetrated.

Therefore, it would be obvious to one having ordinary skill in the art at the time the invention was made to provide a laser machine for the manufacturing printed circuit board of Hailey based on the teachings of Andoh et al. and also to provide a trench of substrate without fully penetrated based on the teaching of Levite et al. in order to form a holes having a minute diameter in accordance with a minute wiring pattern can be formed easily at a high speed or produce a trench for define foil tracks and furthermore, provide at least one electrically conductive media that will provide electrical continuity to an electrical line while a portion of the electrically conductive media is in a trench adjacent the defective area.

Pertaining to claim 39, Hailey as modified by Andoh et al. further discloses said substrate (see fig. 4) is formed of a material having a sufficiently low rate of ablation to prevent unwanted penetration of the substrate during machining (see figs. 3-4A).

Pertaining to claim 3 and 29, Hailey discloses all the claimed limitations except the minimum cutting width are from 25 µm and the maximum value is 30 µm.

However, the width of a split of cutting width with respect to the first metallic conducting part and second metallic part is equal.

Therefore, It would have been obvious to one having ordinary kill in the art at the time the invention was made to adjust the minimum value of the cutting width is 25 µm and the maximum value of the cutting width is 60 µm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boeschu, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980).

Pertaining to claims 10, 11 and 43, Hailey discloses all the claimed limitations except the producing slots of approximately 150 µm lengths at 1.5 mm intervals.

However, producing slots and the length of the interval is equivalent to the metallic conducting part.

Therefore, It would have been obvious to one having ordinary kill in the art at the time the invention was made to adjust the minimum value of the producing slot is 150 µm and the maximum value of the cutting lengths is 1.5 mm interval, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boeschu, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980).

Pertaining to claim 44, Hailey discloses an electrical component (see fig. 4A), involving: bonding a thin metal foil (302, see fig. 4) to an insulating substrate (300, see

fig. 3) and thereby forming a component blank having a metal face that comprises a surface of said metal foil (302); the metal foil (302) of said component blank to produce at least one trench (306, see figs. 3-4a) for defining one or more foil tracks, said trench being at least equal in depth (see figs. 3-4a) to the thickness of the foil so as to prevent current flow across the trench;

But, Hailey does not explicitly teach a laser machine.

Hailey also fails to specifically teach laser machine without fully penetrating the insulating substrate.

However, Andoh et al. teaches a laser machine (see paragraph [0006], lines 12-14) and Levite et al. also teaches a trench of substrate without fully penetrated.

Therefore, it would be obvious to one having ordinary skill in the art at the time the invention was made to provide a laser machine for the manufacturing printed circuit board of Hailey based on the teachings of Andoh et al. and also to provide a trench of substrate without fully penetrated based on the teaching of Levite et al. in order to form a holes having a minute diameter in accordance with a minute wiring pattern can be formed easily at a high speed or produce a trench for define foil tracks and furthermore, provide at least one electrically conductive media that will provide electrical continuity to an electrical line while a portion of the electrically conductive media is in a trench adjacent the defective area.

4. Claims 5-6 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hailey (US 6,349,038 B1) and Andoh et al. (US 2004/0089471 A1) as applied to claim1 above, and further in view of Hirose et al. (US 2004/0025333 A1).

Pertaining to claim 5 and 31, Hailey discloses said insulating material (dielectric-filled moat 306, see column 5, lines 16-20)

But, Hailey does not explicitly teach if the insulating material is made of polymer.

However, Hirose et al. teaches the insulating material is made of polymer.

Therefore, it would be obvious to one having ordinary skill in the art at the time the invention was made to make the insulating material of Hailey out of polymer based on the teachings of Hirose et al. in order to have relatively low melting points and low cost.

Pertaining to claim 6 and 32, Hailey as modified by Andoh et al. and Hirose et al. further disclose wherein said polymer comprises an epoxy resin (see paragraph [0040], lines 6-7 of Andoh et al.).

5. Claims 18-21, 35-36 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hailey (US 6,349,038 B1), Andoh et al. (US 2004/0089471 A1) and Hirose et al. (US 2004/0025333 A1) as applied to claim1 above, and further in view of Chen et al. (US 2005/0116718 A1).

Pertaining to claims 18 and 40, Hailey as modified by Andoh et al and Hirose et al. disclose said insulating substrate (300, see fig. 3 of Hailey).

But, Hailey does not explicitly teach if the insulating material is comprises a plurality of layers of fiberglass prepreg.

However, Chen et al. teaches the insulating material is comprises a plurality of layers of fiberglass prepreg (see paragraph [0007]).

Therefore, it would be obvious to one having ordinary skill in the art at the time the invention was made to make the insulating substrate of Hailey comprise a plurality of layers of fiberglass prepreg based on the teachings of Chen et al. in order to provide a non-conductive structure for mounting components.

Pertaining to claims 19, 20 and 41, Hailey as modified by Chen et al. further discloses said electrical component is a foil sensor, and the method further comprises preparing said component blank by coating said component blank on the surface comprising the ultimate sensor (see paragraph [0007] of Chen et al.) side of said sensor blank with a chemically resistant coating solution, to protect said surface from contamination during sensor processing (see paragraph [0007] of Chen et al.).

Pertaining to claims 21 and 35, Hailey as modified by Chen et al. further discloses electrical component comprises two or more different types of foil sensors (see paragraph [0007] of Chen et al.).

Pertaining to claim 36, Hailey discloses all the claimed limitations except the metal foil has a thickness in the range of 15 to 200 µm.

However, the range of metal foil with respect to the first metallic conducting part and second metallic part is equal.

Therefore, it would have been obvious to one having ordinary kill in the art at the time the invention was made to adjust the metal foil thickness with the range of 15 to 200 µm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boeschu, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

6. Applicant's arguments with respect to claims 1-44 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDARGIE M. AYCHILLHUM whose telephone number is (571)270-1607. The examiner can normally be reached on (Mon-Fri from 8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thompson can be reached on 571-272-2342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A.A.
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/Yuriy Semenenko/
Primary Examiner, Art Unit 2835